Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A method of suppressing side lobe interference in a beamforming process, the method comprising:

receiving a plurality of sensor signals comprising elemental data;

forming a main beam comprised of main beam samples using all of the sensor signals, wherein said forming includes applying weights to the main beam samples to reduce sidelobe levels of the main beam;

combining a small subset of the plurality of sensor into signal pairs, wherein the small subset of the plurality of sensor signal that are combined into signal pairs comprise signals from sensors that are adjacently located near the edges of the array;

calculating a complex weighting factor for each signal in a pair such that the maximum response axis of the resulting signal pair combination is aligned with the maximum response axis of the main beam;

assigning opposite amplitudes to each signal in the pair to produce delta-channel auxiliary signals having zero response along the maximum response axis;

computing a covariance matrix, M, using the delta-channel auxiliary signals, wherein each member of the covariance matrix, M, is an estimate of the covariance between two delta-channel auxiliary signals such that the whole matrix contains estimates of every possible delta-channel auxiliary signal combination and the main diagonal of the covariance matrix contains the variance of the corresponding delta-channel auxiliary signal;

computing a cross-covariance vector, A, using the delta-channel auxiliary signals and the main beam;

computing a vector of delta-channel auxiliary signal weights;

multiplying each sample from each delta-channel auxiliary signal by its corresponding weight to yield weighted delta-channel auxiliary signals;

summing the weighted delta-channel auxiliary signals to obtain suppressor channel samples; and

subtracting the suppressor channel samples from the main beam samples to obtain an interference-free main beam.

2-3 (canceled)

4. (currently amended) The method of claim ~~3~~ 1 wherein the covariance matrix, *M*, is calculated according to:

$$M = \frac{1}{N}\left(A \cdot A^H\right).$$

where,

the delta-channel auxiliary signal samples are arranged along columns in a matrix *A*;

N is the number of samples; and

H denotes combined conjugation and transposition.

5. (original) The method of claim 4 wherein the samples from the main beam are arranged in a column vector, $\boldsymbol{B_0}$, and the cross-covariance vector, Λ, is calculated according to:

$$\Lambda = \frac{1}{N}\left(A \cdot B_0^H\right).$$

6. (original) The method of claim 5 wherein the delta-channel auxiliary signal weights are calculated according to:

$$w = \left(M^{-1}\Lambda\right)^*$$

where the (*) symbol denotes conjugation.

7. (original) The method of claim 1 further comprising:

applying an element-by-element weighting to the elemental data to adjust the maximum response axis of the array of sensors and to reduce array sidelobe levels.

8. (currently amended) A system for suppressing side lobe interference in a beamforming process, the system comprising:

means for receiving a plurality of sensor signals comprising elemental data;

means for forming a main beam comprised of main beam samples using all of the sensor signals, wherein said forming includes applying weights to the main beam samples to reduce sidelobe levels of the main beam;

means for combining a small subset of the plurality of sensor signals into signal pairs, wherein the small subset of the plurality of sensor signal that are combined into signal pairs comprise signals from sensors that are adjacently located near the edges of the array;

means for calculating a complex weighting factor for each signal in a pair such that the maximum response axis of the resulting signal pair combination is aligned with the maximum response axis of the main beam;

means for assigning opposite amplitudes to each signal in the pair to produce delta-channel auxiliary signals having zero response along the maximum response axis;

means for computing a covariance matrix, *M*, using the delta-channel auxiliary signals, wherein each member of the covariance matrix, *M*, is an estimate of the covariance between two delta-channel auxiliary signals such that the whole matrix contains estimates of every possible delta-channel auxiliary signal combination and the main diagonal of the covariance matrix contains the variance of the corresponding delta-channel auxiliary signal;

means for computing a cross-covariance vector, *A*, using the delta-channel auxiliary signals and the main beam;

means for computing a vector of delta-channel auxiliary signal weights;

means for multiplying each sample from each delta-channel auxiliary signal by its corresponding weight to yield weighted delta-channel auxiliary signals;

means for summing the weighted delta-channel auxiliary signals to obtain suppressor channel samples; and

means for subtracting the suppressor channel samples from the main beam samples to obtain an interference-free main beam.

9-10 (canceled)

11. (currently amended) The system of claim ~~10~~ 8 wherein the covariance matrix, M, is calculated according to:

$$M = \frac{1}{N}\left(A \cdot A^{H}\right).$$

where,

the delta-channel auxiliary signal samples are arranged along columns in a matrix A;
N is the number of samples; and
H denotes combined conjugation and transposition.

12. (original) The system of claim 11 wherein the samples from the main beam are arranged in a column vector, $\boldsymbol{B_0}$, and the cross-covariance vector, Λ, is calculated according to:

$$\Lambda = \frac{1}{N}\left(A \cdot B_0^{H}\right).$$

13. (original) The system of claim 12 wherein the delta-channel auxiliary signal weights are calculated according to:

$$w = \left(M^{-1}\Lambda\right)^{*}$$

where the (*) symbol denotes conjugation.

14. (original) The system of claim 8 further comprising:

means for applying an element-by-element weighting to the elemental data to adjust the maximum response axis of the array of sensors and to reduce array sidelobe levels.

15. (currently amended) A system for suppressing side lobe interference in a beamforming process comprising:

a processor readable storage medium;

code recorded in the processor readable storage medium to receive a plurality of sensor signals comprising elemental data;

code recorded in the processor readable storage medium to form a main beam comprised of main beam samples using all of the sensor signals, wherein said forming includes applying weights to the main beam samples to reduce sidelobe levels of the main beam;

code ~~reorded~~ recorded in the processor readable storage medium to combine a small subset of the plurality of sensor signals into signal pairs, wherein the small subset of the plurality of sensor signal that are combined into signal pairs comprise signals from sensors that are adjacently located near the edges of the array;

code recorded in the processor readable storage medium to calculate a complex weighting factor for each signal in a pair such that the maximum response axis of the resulting signal pair combination is aligned with the maximum response axis of the main beam;

code recorded in the processor readable storage medium to assign opposite amplitudes to each signal in the pair to produce delta-channel auxiliary signals having zero response along the maximum response axis;

code recorded in the processor readable storage medium to compute a covariance matrix, M, using the delta-channel auxiliary signals, wherein each member of the covariance matrix, M, is an estimate of the covariance between two delta-channel auxiliary signals such that the whole matrix contains estimates of every possible delta-channel auxiliary signal

combination and the main diagonal of the covariance matrix contains the variance of the corresponding delta-channel auxiliary signal;

code recorded in the processor readable storage medium to compute a cross-covariance vector, A, using the delta-channel auxiliary signals and the main beam;

code recorded in the processor readable storage medium to compute a vector of delta-channel auxiliary signal weights;

code recorded in the processor readable storage medium to multiply each sample from each delta-channel auxiliary signal by its corresponding weight to yield weighted delta-channel auxiliary signals;

code recorded in the processor readable storage medium to sum the weighted delta-channel auxiliary signals to obtain suppressor channel samples; and

code recorded in the processor readable storage medium to subtract the suppressor channel samples from the main beam samples to obtain an interference-free main beam.

16-17 (canceled)

18. (currently amended) The system of claim ~~17~~ 15 wherein the covariance matrix, M, is calculated according to:

$$M = \frac{1}{N}\left(A \cdot A^{H}\right).$$

where,

the delta-channel auxiliary signal samples are arranged along columns in a matrix A;

N is the number of samples; and

H denotes combined conjugation and transposition.

19. (original) The system of claim 18 wherein the samples from the main beam are arranged in a column vector, $\boldsymbol{B_0}$, and the cross-covariance vector, A, is calculated according to:

$$\Lambda = \frac{1}{N}\left(A \cdot B_0^H\right).$$

20. (original) The system of claim 19 wherein the delta-channel auxiliary signal weights are calculated according to:

$$w = \left(M^{-1}\Lambda\right)^*$$

where the (*) symbol denotes conjugation.

21. (original) The system of claim 15 further comprising:

applying an element-by-element weighting to the elemental data to adjust the maximum response axis of the array of sensors and to reduce array sidelobe levels.